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2019 FACILITY SPACE USAGE STUDY

United States Postal Service
Cost Attribution
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INTRODUCTION

This report describes a Facility Space Usage Study (FSUS) that was planned, implemented, and completed by the United States Postal Service (USPS) during a two-year period that ended in September 2019. This study represents an update of the previous FSUS that was conducted in 1999 and ultimately presented in Docket No. R2005-1, USPS LR-K-62.

The Postal Service began the planning process for an update to the FSUS in 2017. The data collection phase of the study began in early 2018 and ended roughly 18 months later. The space values by operation and function were taken directly from postal data systems wherever possible. The remaining space was estimated using sampling techniques. The sample design included 11 mail processing facility strata and six delivery and retail facility strata. Space data from the layouts representing 103 mail processing facility groups and 150 delivery and retail units were collected and disaggregated into space by operation and function.[1] The sample statistics were used to inflate the space data into population estimates using the "combined ratio" sampling technique.[2] In essence, this methodology was used to disaggregate the total electronic Facility Management System (eFMS) building gross square footage for active postal-managed buildings into space categories representing each operation and function.

These data were analyzed for accuracy and are shown in Table 1 below. Table 1 presents the space distribution by operation and function as of the end of fiscal year (FY) 2019, quarter 1.

[1] A facility group is defined to be a major processing facility and any annexes that may be associated with that facility.
[2] Cochrane, William G. (1999). *Sampling Techniques (Third Edition)*, at 164-169. New York: John Wiley & Sons.

Table 1:
Facility Space Usage Study Space Summary

No.	Operation / Function		All Facilities Building Gross Square Feet	Percent Distribution
1	MODS 11 & 15	D/BCS	12,853,171	4.196%
2	MODS 12 & 17	AFSM100	5,151,274	1.682%
3	MODS 12 & 17	FSS	3,329,240	1.087%
4	MODS 13	APBS	9,453,417	3.086%
5	MODS 16	LCUS-SSM	1,613,493	0.527%
6	MODS 16	1TRAYSRT	3,985,836	1.301%
7	MODS 14	MANF	925,238	0.302%
8	MODS 14	MANL	953,668	0.311%
9	MODS 14	MANP	2,511,204	0.820%
10	MODS 14	PRIORITY	902,869	0.295%
11	MODS 15	LD15RECS	347,928	0.114%
12	MODS 17	1CANCEL	2,668,509	0.871%
13	MODS 17	1DSPATCH	763,477	0.249%
14	MODS 17	1MTRPREP	39,021	0.013%
15	MODS 17	1OPBULK	542,543	0.177%
16	MODS 17	1OPPREF	894,104	0.292%
17	MODS 17	1OPTRANS	0	0.000%
18	MODS 17	1PLATFRM	7,942,716	2.593%
19	MODS 17	1POUCHNG	225,182	0.074%
20	MODS 17	1PRESORT	84,041	0.027%
21	MODS 17	1SACKS_H	42,511	0.014%
22	MODS 17	1SCAN	1,294,658	0.423%
23	MODS 18	BUSREPLY	31,517	0.010%
24	MODS 18	EXPRESS	403,861	0.132%
25	MODS 18	REGISTRY	468,064	0.153%
26	MODS 18	REWRAP	85,108	0.028%
27	MODS 18	1EEQMT	2,236,781	0.730%
28	MODS 18	1MISC	133,033	0.043%
29	MODS 18	1SUPPORT	6,258	0.002%
30	All LDCs	INTL ISC	2,434,592	0.795%
31	NDCS 12 & 17	FSS	328,647	0.107%
32	NDCS 14	MANP	633,382	0.207%
33	NDCS All LDCs	OTHER	951,088	0.310%
34	NDCS 17	PLA	1,960,681	0.640%
35	NDCS 13	PSM	3,458,428	1.129%
36	NDCS 13	APBS	915,039	0.299%
37	NDCS 16	LCUS-SSM	729,622	0.238%
38	NDCS 16	TRAYSORT	761,036	0.248%
39	NONMODS IOCS	ALLIED	13,645,140	4.455%
40	NONMODS IOCS	AUTO/MECH	129,573	0.042%
41	NONMODS IOCS	BULKACC	1,673,356	0.546%
42	NONMODS IOCS	BUSREPLY	64,765	0.021%
43	NONMODS IOCS	CFS	4,425,592	1.445%
44	NONMODS IOCS	D.PO BOX	12,250,838	3.999%
45	NONMODS IOCS	EXPRESS	71,732	0.023%
46	NONMODS IOCS	MANF	4,293,378	1.402%
47	NONMODS IOCS	MANL	3,748,355	1.224%
48	NONMODS IOCS	MANP	19,141,118	6.249%
49	NONMODS IOCS	MISC	1,960,199	0.640%
50	NONMODS IOCS	OTH ACCT	800,880	0.261%
51	NONMODS IOCS	REGISTRY	663,176	0.217%
52	Window Service		18,220,608	5.948%
53	Self-Service Postal Center		738,228	0.241%
54	Post Office Boxes / Caller Service		12,074,197	3.942%
55	Claims & Inquiry		122,940	0.040%
56	City Carrier		35,255,807	11.510%
57	Rural Carrier		21,330,487	6.964%
58	Office Space / Corridors		24,029,897	7.845%
59	Mail Processing Equipment Maintenance		5,468,995	1.785%
60	Other Equipment Maintenance		1,293,900	0.422%
61	Employee Facilities		16,612,468	5.423%
62	Vehicle Maintenance Facility (VMF)		5,426,578	1.772%
63	Covered Vehicle Storage and Parking (CVS)		13,658,010	4.459%
64	Vacant & Tenant		4,820,660	1.574%
65	HQ, HQ Field Related and Area Offices		6,849,016	2.236%
66	Mail Transportation Equipment Service Centers (MTESC)		0	0.000%
67	Storage Facilities		5,478,839	1.789%
Total			306,309,966	100.000%

The Table 1 line items that comprise the mail processing function (operations 1 through 51) reflect the cost pool structure presented by the Postal Service in Docket No. RM2018-10, Proposal Seven. Proposal Seven was subsequently approved by the Commission in Order No. 4855 (October 12, 2018).

The Table 1 data are used to distribute Cost and Revenue Analysis (CRA) facility-related space provision and space support costs. The space provision costs are rents (component 15.1), building and leasehold depreciation (20.3), and interest expense (20.5). The space support costs are custodial personnel (component 11.1.1), contract cleaners (11.1.2), plant and building equipment maintenance (11.3), fuel (15.2.1), utilities (15.2.2), custodial and building supplies and services (16.3.1), and USPS security force (18.1.4.1). In FY 2018, these costs accounted for $4.7 billion, or 6.3 percent of the total costs.

This report is organized into six sections. The first section outlines the objective of the study. The second section lists the data sources used to complete the study. The third section covers the sample design. The fourth section explains the data collection process. The fifth section describes the data analysis process. The sixth section discusses the study results.

I. OBJECTIVE

The objective of this study was to disaggregate the total eFMS building gross square footage space into space estimates for 67 categories that represent postal operations and functions. This task was accomplished using a combination of both "non-sampled" and "sampled" space.

The non-sampled space is that eFMS space that can be directly assigned to one of the 67 categories. For example, the space survey portion of eFMS contains data for vehicle maintenance facility (VMF) space (field 13), vacant/General Service Administration (GSA)/tenant space (field 14), enclosed platform space (field 23), open platform space (field 24), postal vehicle and employee interior parking space (field 27D), and customer interior parking space (field 28D). Most of this space can be directly mapped to specific operations or functions, and therefore does not require the application of any sampling techniques.

The sampled space is that space which is assigned to operations or functions using sampling techniques. All postal-managed facilities are first grouped into strata. The space breakdown for a sample of facilities within each strata are then collected and the results are inflated into population results using the methods described below.

II. DATA SOURCES

Several data sources were used to develop these space estimates. These data sources included the electronic Facility Management System (eFMS), the Facility Database System (FDB), the Facility File Share (FFS) drive, the web End-of-Run system (webEOR), and the web Management Operating Data System (webMODS).

A. Electronic Facility Management System (eFMS)

The eFMS data system is the official postal record for all USPS-controlled property and is used to manage business processes related to lease management, real property assets, repair and construction projects, facility planning and optimization, and facility energy use. It is organized using property identification numbers and there is

generally one record for each property. An example of an FMS record for one processing and distribution center (P&DC) is shown below.

Property ID No.	Post Office Name	Building Gross Sq. Ft.
482031-G17	P&DC	121,761

The space survey portion of eFMS is used extensively in this analysis, and contains various space statistics, for a given facility, such as the net interior square footage and the building gross square footage. The space data are used to develop the sample frame for mail processing and delivery and retail facilities. In addition, the eFMS data are used to inflate the sample statistics to population statistics by strata.

B. Facility Database System (FDB)

The Facility Database System is a postal software application tool that is used for sharing property data and managing the various types of business functions within occupied buildings. It is organized using facility identification numbers, and there can be multiple identification numbers associated with one property. Facility type and facility subtype categories are used to distinguish these records from one another. For example, the P&DC cited above contains an on-site VMF and is also classified as a main office. The FDB system therefore contains the following three facility identification records for this P&DC.

Facility ID	Facility Type	Facility Subtype	Building Gross Sq. Ft.
1435746	DELV_RETAIL	MAIN_PO	121,761
1435989	CUST_SERV	VMF	121,761
1441183	NET_OPS	PDC_PDF	121,761

The facility subtype data are used in this analysis to organize delivery and retail facilities into the various groups (e.g., main office, station, branch, carrier annex). In

addition, the FDB system contains data pertaining to the number of carrier routes at a given facility, which are used in this analysis.

C. Facility File Share (FFS) Drive

The Facility File Share drive is an online repository for postal facility layouts. All available facility layouts were moved to this drive in January 2019 from a previous storage location that had been maintained by a postal vendor. The layouts for mail processing facilities and delivery and retail facilities (D&R) are stored in separate directories in FFS and are grouped by Area.

In this study, a mail processing facility is defined to be any facility that houses mail processing equipment. The one exception is D&R facilities that contain an automated delivery unit sorter (ADUS). These facilities are still classified as D&R facilities.

The FFS drive contains layouts for virtually all mail processing facilities and their associated annexes. It also contains layouts for several hundred D&R facilities, but does not contain layouts for all those facilities. The layouts are accessed using the AutoCAD 3D Map 2015 application software (hereafter referred to as PostalCAD).

D. Web End-Of-Run (webEOR) System

The webEOR system is an online tool that is used to access processing statistics for postal facilities that house sorting equipment. The main menu for each parent site contains a "machine mapping" section that lists the equipment located at all the facilities reporting to webEOR through each site. These data were used to construct a list of current mail processing facilities and to verify that the equipment contained in a given facility layout matched that shown in webEOR.

E. Web Management Operation Data System (webMODS)

The webMODS system contains work hour and volume data specific to postal facilities that report to MODS. The webMODS reports are used in this analysis to verify that the major operations for a given mail processing facility are represented in the facility layouts. In addition, the operation numbers in these reports are used to determine how some space should be categorized.

III. SAMPLE DESIGN

Unlike the previous study, the FSUS data were not collected directly from field personnel. A Headquarters team conducted this study using a combination of eFMS data and space data collected from the facility layouts on the FFS drive. In some cases, the non-sampled space data from specific eFMS space survey fields (e.g., VMF, interior parking) or eFMS records (e.g., Mail Recovery Center, Computerized Forwarding System sites) were directly added to the space estimates for a given operation or function. The remainder of the space data were collected from FFS facility layouts that were sampled as part of this study. Separate sample design methods were used for mail processing facilities and delivery and retail facilities.

A. Mail Processing Facilities

The mail processing sample was designed to include all MODS-reporting processing and distribution centers and facilities (P&DC/F), network distribution centers (NDC), international service centers (ISC), and the remote encoding center (REC). The intent of this sample structure was to align the space categories with the facility groups utilized in the development of the MODS mail processing labor costs in Cost Segment 3.

1. Sample Frame

The mail processing sample frame was based on a list of active plants representing finance numbers reported in "Function 1" labor distribution codes (LDC) 11-18 in the FY 2017, Quarter 2, year-to-date MODS dataset. Each MODS-reporting finance number is coded with the type of facility for each finance number (P&DC/F, NDC, ISC, and REC). The MODS data are also used to identify plants and NDCs with active Flats Sequencing System (FSS) operations, in anticipation of defining separate sampling strata for facilities with and without FSS equipment.

The MODS finance numbers were matched with eFMS data, which provide overall facility square footage, among other data, on Postal Service owned and leased real property. When a property identification number is established in eFMS, the first six digits typically represent the finance number. In some cases, however, it was necessary to manually match the eFMS property identification number with the finance number as the finance numbers had changed over time. In addition, the eFMS records for P&DC/F annexes were also identified.

MODS facility equipment quantities by machine type were collected by finance number. These data were matched to the sample records and served as proxies for certain operation-specific facility space for sample size planning.

The mail processing sample was based on facility "groups," rather than individual facilities. A facility group was defined to be any P&DC/F and its associated annexes. The original population consisted of 261 mail processing facility groups: 193 P&DC/Fs without FSS, 41 P&DC/Fs with FSS, 17 NDCs without FSS, 3 NDCS with FSS, 1 co-located NDC and P&DC/F, 5 ISCs, and 1 REC.

2. Sample Method

The mail processing facility sample relied on stratification methods to improve the precision of the estimates of space for the operation and function categories. Stratified random samples produce statistically efficient estimates when the variance of the data within the strata is small relative to the overall variance. The stratification of postal plants was accomplished in two ways. First, the strata were organized based on the distinct roles that the facilities serve in the postal network. Second, some strata were also organized by size.

The P&DC/F, NDC, ISC, and REC categories correspond to the facility groups and cost pools in the CRA model for cost segment 3.1. The ISC and REC workroom floor space was directly mapped to those operations (numbers 30 and 11, respectively, in Table 1) and did not need to be disaggregated to a finer level. The NDCs are unique in that they contain parcel sorting machines (PSM) and, with the exception of the three NDC FSS sites, lack automated letter and flat processing equipment. Given that there are relatively few NDCs compared to P&DC/Fs, the separation of the NDC strata from the other plants allows for a lower sampling fraction. Similarly, separate strata are defined for FSS and non-FSS plants to allow for efficient estimation of FSS-related space without requiring excessively high sampling rates for non-FSS plants. The non-FSS plant group, in turn, contributes no variance to the amount of space allocated to FSS.

The facilities within the FSS and non-FSS strata are grouped according to facility size. Size stratification is advantageous because the population of mail processing facilities has characteristics in which a stratified sample offers large gains in relative

precision when compared to a non-stratified sample.[3] For example, there is considerable size variation across the population. The non-FSS P&DC/Fs range in size from less than 50,000 square feet to over one million square feet. In addition, the facility size is closely related to the operation-specific amounts of space. Larger facilities tend to house more processing equipment than smaller facilities, and may contain dedicated operational space that would not typically be found in smaller facilities. The facility size measure that serves as the stratification variable is the USPS-occupied square feet as reported in eFMS. Generally speaking, the USPS-occupied square feet is equal to the total gross building square feet less the exterior platform space and covered parking space.

Construction of the size strata followed the Dalenius-Hodges (cumulative $\sqrt{f}$) method.[4] In this approach, a histogram of the stratification variable is compiled, the square root of the frequency ($\sqrt{f}$) is computed for each element of the histogram, and the cumulative sum of $\sqrt{f}$ is computed over the entire range. For *L* strata, the stratum boundaries are then chosen to create equal intervals of (approximately) equal cumulative $\sqrt{f}/L$ values. The number of strata *L* is chosen to permit adequate sample sizes for each stratum under the sample allocation rule, given a sample size that yields the targeted relative precision of the estimate(s).

3. Sample Size

The sample allocation uses the Neyman rule in which the stratum sample sizes n_h are proportional to $W_h S_h$, where the stratum weight $W_h = N_h/N$ and S_h is the

[3] Cochran, op. cit., at 101-103.
[4] Cochran, op. cit., at 129-131.

standard deviation of the estimate within stratum h. Given that the space allocated to the various operations and functions is unknown in advance (and therefore the S_h value is unknown), the sample sizes are developed using proxies of S_h derived from the quantity of machines for four major equipment types with associated space categories: the delivery bar code sorter (DBCS), the automated flat sorting machine model 100 (AFSM100), the automated parcel and bundle sorter (APBS) / automated package processing system (APPS), and the FSS. Table 2 below shows the original sample design and includes the plant strata, the population counts, and the sample sizes.

Table 2:
Mail Processing Sample Design

Stratum No.	Category	Facility Size Square Feet	Population USPS Occupied Square Feet	Facility Group Population	Facility Group Sample
S1	PDC/F With Annexes (No FSS)	< 150,000	6,797,090	75	11
S2	PDC/F With Annexes (No FSS)	150,000 - 300,000	12,555,807	58	14
S3	PDC/F With Annexes (No FSS)	300,000 - 500,000	14,427,687	38	20
S4	PDC/F With Annexes (No FSS)	> 500,000	17,562,506	22	10
S5	PDC/F With Annexes (FSS)	< 600,000	9,176,668	24	18
S6	PDC/F With Annexes (FSS)	> 600,000	13,623,269	17	7
S7	NDC (No FSS)	All	8,276,455	17	7
S8	NDC (FSS)	All	1,862,876	3	3
S9	NDC (Co-located NDC/PDC/Annex)	All	1,522,246	1	1
S10	ISC	All	2,825,542	5	5
S11	REC	All	74,306	1	1
	Total		**88,704,452**	**261**	**97**

This plant sample is used to produce facility space estimates for numerous equipment types and other space categories. Thus, there is no single criterion that can be used to determine sample size requirements. The adequacy of the sample size is assessed using criteria for major equipment categories. The quantities of machines by facility for major equipment types (DBCS, AFSM100, APBS/APPS, and FSS) are used as proxies for space allocations. The space used for specific equipment types is

affected by both the number of machines and the space allocated for each machine. However, most variability in equipment space usage across facilities is due to the machine quantities for the various equipment types.

4. Estimator

The sample size is selected to produce sampling coefficients of variation (CV) of less than five percent for the DBCS and AFSM100 proxies, using a combined ratio estimator.[5] The FSS and APBS/APPS CV values are estimated, but not specifically targeted. Table 3 below shows the estimated proxy CV values for the sample sizes in Table 2. Given that the proxy CV values are lower than the targets for the DBCS and AFSM100 categories, and well under 10 percent for the FSS and APBS/APPS categories, the sample sizes are considered to be adequate.

Table 3:
Ex Ante Coefficients of Variation

Equipment Type	Estimated Coefficient of Variation
DBCS	4.3%
AFSM100	3.8%
APBS/APPS	7.4%
FSS	7.3%

B. Delivery and Retail Facilities

The delivery and retail sample is designed to include those facilities that are classified as main offices, stations and branches, and carrier annexes. When the previous study was conducted in 1999, delivery units housed a fair amount of mail processing equipment (e.g., the CSBCS, or carrier sequence bar code sorter). The only

[5] Cochrane, op. cit., at 165-167.

processing equipment currently found in delivery units is the ADUS, which is used to automate the carrier route sortation of machinable parcels.[6]

One would therefore not expect to see as much variation in the usage of delivery unit space in the current study. The facility space requirements at the vast majority of delivery and retail facilities are based on factors such as the number of carriers, the number of box sections, and the presence of window service operations.

1. Sample Frame

The delivery and retail sample frame is based on a list of active facility records in eFMS obtained from the electronic data warehouse (EDW). The FDB subcategories are used to separate the facility records into lists of main offices, stations and branches, and carrier annexes. The sample population consists of 30,486 delivery and retail facility records: 25,693 main office records, 4,284 station and branch records, and 509 carrier annex records.

2. Sample Method

The delivery and retail sample also relies on stratification methods. Separate strata are established for the three facility types (main offices, stations and branches, and carrier annexes). The variation in main office space is substantial. Some facilities that are classified as main offices contain less than 100 square feet of space, while other facilities contain over 300,000 square feet of space.[7] Consequently, the main office sample is organized into three separate strata based on the size of the facility. The stations and branches and carrier annex facilities do not exhibit as much space

[6] The ADUS is currently deployed to 10 delivery and retail facilities.
[7] Some facilities that were once plants are now classified as main offices because they no longer house any processing equipment.

variation and are therefore assigned to their own unique strata. Finally, the ten facilities that house ADUS equipment (five main offices, four stations, and one carrier annex) are grouped into a separate stratum.

3. Sample Size

While the sample is stratified in form, the sample sites have not been randomly selected. A field study in which delivery units are sampled randomly is neither practical nor feasible. The drawings for delivery units are not maintained to the extent that the drawings for mail processing facilities are maintained. Mail processing layouts need to be kept up-to-date for reasons that do not necessarily apply to delivery units. For example, equipment movements are common in mail processing facilities. The plant layouts therefore need to be regularly maintained so that maintenance employees can determine where to route power cabling and where to position machines when a given piece of equipment is removed or installed. The vast majority of delivery units are not faced with these issues.

Given that the operations at delivery and retail facilities are relatively uniform when compared to mail processing facilities, the better alternative is to develop a sample using available drawings. The fact that some delivery and retail drawings are located on the FFS drive makes it more likely that these drawings have been recently updated and/or are current. If strict random sampling methods were to be used, data collectors would need to engage in the time consuming process of trying to determine whether a drawing for a given facility exists, where it is located, and whether it reflects current operations. In cases where such drawings might not exist or are not current, those employees would then need to physically visit the facility and measure the facility

space by hand. This approach would, of course, be costly to implement and disruptive to the operations performed at those facilities.

As stated above, there are a limited number of delivery and retail facility drawings stored on the FFS drive. The Postal Service assembled a list of usable drawings and then began processing them using the methods described below. An effort was made to include facilities in the sample from as broad a geographic area as possible.

The sample sizes were not determined by any empirical means. As facility layouts were processed, the Postal Service monitored the impact on the overall space distribution by operation and function. In total, the sample included 150 facilities from 35 states and 45 Districts. The sample design is summarized in Table 4 below.

Table 4:
Delivery and Retail Sample Design

Stratum No.	Category	Facility Size Square Feet	Population Building Gross Square Feet	Facility Population	Facility Sample
S12	Main Office	< 10,000	57,279,251	23,136	42
S13	Main Office	10,000 - 20,000	24,848,361	1,533	25
S14	Main Office	> 20,000	44,249,516	1,019	23
S15	Station / Branch	All	49,861,465	4,280	42
S16	Carrier Annex	All	10,806,728	508	13
S17	Delivery Unit ADUS Site	All	1,120,142	10	5
	Total		**188,165,463**	**30,486**	**150**

4. Estimator

The combined ratio estimator was also applied to the delivery and retail sample. In addition, a delivery and retail analysis was conducted in which groups of facilities were randomly removed from the analysis in order to assess the impact on the results. Four different scenarios were investigated in which 21, 30, 39, and 50 facilities were randomly removed. Ten iterations were performed for each scenario. The results from this analysis showed that these simulated changes had little impact on the results. The

Postal Service therefore stopped processing drawings after the sample included 150 facilities, and the sample was determined to be adequate.

IV. DATA COLLECTION

The Postal Service relied on a more centralized data collection plan when compared to the 1999 study. Unlike the previous study, space data were not collected directly from field personnel. Instead, a six-member Cost Attribution team conducted the study. This plan ensured that the space data were allocated to the operations and functions in a consistent manner. In cases where problems were detected, or there were questions concerning the layouts, field personnel were contacted for further clarification.

In addition, there were tools that were utilized during this study that were not available in 1999. For example, end-of-run (EOR) and MODS data were not as readily available in 1999. These data for all facilities are now easily accessed on the Postal Service's intranet through the webEOR and webMODS applications, respectively.

The data collection methods used to process the drawings consisted of four primary steps: planning, tagging, mapping, and reviewing.

A. Planning

The team members first obtained access to the necessary data sources (e.g., eFMS and PostalCAD). They also participated in meetings with the headquarters operations industrial engineering (OIE) group in which the structure of the online layout repository was discussed. The layouts within the mail processing and delivery and retail directories were then reviewed for completeness.

Data collection forms and instructions were created to facilitate the tagging and mapping process. For the mail processing MODS operations performed at plants (items one through 38 in Table 1), the lists of operation numbers that make up each cost pool from Docket No. ACR2018, USPS-FY18-7, Part 1, Tables I-2B and I-3B, were designated as the official "maps" used to allocate space to those operations.

Field observations were performed at two of the largest plants in the sample. The OIE and other field personnel at these facilities walked the workroom floor with Cost Attribution employees and verified that the layouts were accurate.[8] The layouts for these two facilities were then used to establish formal methods for tagging the space in each facility and mapping that space to the 67 operations and functions.

B. Tagging

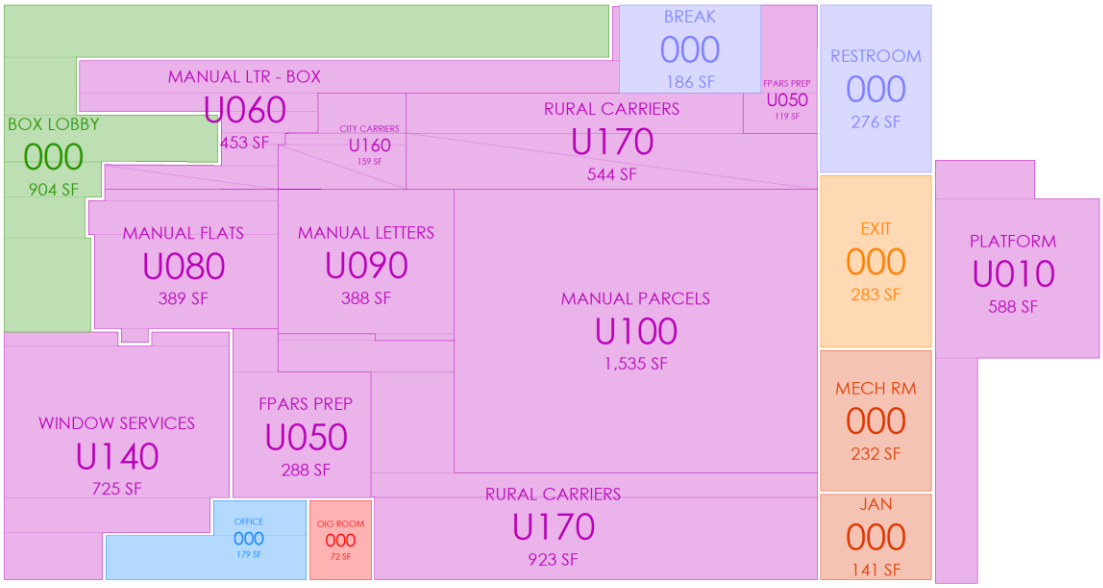
For each sample facility, the PostalCAD architecture and workroom floor drawings were downloaded from the FFS drive. A webEOR report for that facility was also obtained in order to ensure that the webEOR equipment list matched the equipment contained in the drawing. In addition, a webMODS report was accessed (for MODS facilities) in order to see what operations should be contained in the facility. Finally, the number of city and rural carriers was obtained from FDB.

The PostalCAD software allows users to generate "space management" drawings that depict operational and functional blocks with the associated square footage. PostalCAD users can initiate commands that create closed boundaries around an area by tracing the workroom floor or support space from underlying external references. The "tag space" feature can then be used to identify this space and display

[8] During the course of completing other Cost Attribution projects, field observations were performed at 11 other sample plants and four sample delivery units and the layouts were also verified to be accurate.

the area in square feet. The workroom floor and support space was tagged in this manner for all sample facilities. The space management drawing for a small delivery unit is shown below in Figure 1.

Figure 1:
Space Management Drawing



Once a facility space management drawing was completed, the space management report (SMR) function was used to generate a text file list of the operations and their associated space values. The text file was then converted into a Microsoft Excel worksheet. This worksheet was used as an input to the mapping process.

C. Mapping

A Microsoft Excel mapping file was assembled for each facility in the sample and consisted of two worksheets: (1) the worksheet generated from the space management

drawing, and (2) a space form worksheet. The latter worksheet was used to organize the space data from the former worksheet into space estimates by operation and function. The mapping files are located in the 'MAPPING FILES.zip' file.

The eFMS data were also entered into the space form for each facility so that a comparison could be made between the square footage values shown in eFMS and the total space measured using PostalCAD. To the extent that a given drawing contained space for non-sampled areas (i.e., those areas for which eFMS data are used directly in this analysis) that space was also measured so that this comparison could be made.

The extent to which the measured space from the tagged layouts differed from the eFMS space varied from facility to facility. When the difference appeared significant (over 10 percent), the Postal Service attempted to investigate the discrepancy. Field employees were contacted to ensure that no space was missing. The numbers within the eFMS records were analyzed and, on occasion, there appeared to be some numerical eFMS data entry errors. In general, facilities were not excluded from this analysis unless there was definitive proof that there were portions of the layouts that were missing. In total, the mail processing measured space was 2.710 percent less than the eFMS space. The total delivery and retail measured space was 0.141 percent more than the eFMS space. While the differences between the measured and eFMS space at some facilities were higher than average, the total space measured for all facilities was relatively close to the eFMS total space values.

The space form also contained cells where space values could be entered that were not specific to any operation or function (aisle space, other access space, unspecified work room floor staging space, and overall facility support space). Section

V of this report describes how this space was distributed to the operations and functions. Finally, the number of carriers as shown in the FDB were also entered into the space form.

D. Reviewing

The tagging process was completed by a postal contractor. The initial mapping process was completed by the contractor and other team members. The mapping files were then reviewed for accuracy. The review process was performed by a team member with an industrial engineering background who had previously developed and maintained plant and delivery unit facility layouts in the field, as well as within a Headquarters engineering group. PostalCAD commands were used to measure the space where changes needed to be made. When changes were required in a given mapping file, the modifications were noted in the right margin of the space management worksheet and the space was mapped according to those notes in the space form worksheet.

In January 2019, the PostalCAD drawings were moved to the FFS drive. Some field sites used this opportunity to update their drawings. At that point in time, most of the mail processing facilities had already been tagged and mapped. Given the amount of time that had elapsed since the data collection process had been initiated, the FFS drawings were again reviewed to see if any major changes had been made. In addition, the webEOR machine mapping pages for all mail processing facilities were again analyzed to see whether there had been any changes to the equipment quantities located at each facility.

There were ten facilities where equipment and operations on the workroom floor had undergone major changes. These drawings were reprocessed using the methods described above. In other cases, there were some pieces of equipment that had been removed since the original drawing had been processed. If the layout was largely the same, with the exception that the equipment had been removed, the affected space was measured, a modification note was entered into the space management worksheet in the mapping file, and the space form was remapped accordingly. If the equipment removal had an impact on the location of other equipment and operations, the drawings were also reprocessed using the methods described above.

The review process was completed before the end of January 2019. The Postal Service therefore considers the results of this study to be reflective of the mail processing environment that existed at the end of FY 2019, Quarter 1.

V. DATA ANALYSIS

The calculations that are used to estimate the space by operation and function are performed in the 'Facility Space Summary.xlsx' file. This file introduces the total building gross square footage from eFMS for all active postal-managed facilities into the analysis and is also linked to the mapping files described above. It contains the sample data worksheets, eFMS summary worksheet, peak adjustment worksheet, strata worksheets, R worksheet, functional total worksheets, summary worksheet, and coefficient of variation worksheet.

A. Sample Data Worksheets

The 'Sample Strata' worksheet (page 6) contains the overall sample design for the mail processing and delivery and retail facilities based on the building gross square

footage values that are used to inflate the sample statistics into population statistics. It should be noted that the mail processing sample design does not match the original sample design shown in Table 2 above. This change occurred for two reasons. First, the mail processing network changed during the time period it took for the drawings to be tagged and mapped. Some new sample facilities were activated and some were closed. Had these changes occurred prior to sample selection, these facilities might have been part of different strata based on the facility size. For purposes of this analysis, however, those facilities are still located in their original strata.

Second, there were some eFMS mail processing facility records that were found over the course of this project that were not included in the original sample. For example, there are a handful of air mail centers and air mail facilities (AMC/F) that still exist, but were not identified when the original sample was developed. The activities performed at these facilities would be the same as activities that might occur at other plants that are located in close proximity to an airport or are on airport property. Consequently, these facilities were added to the list of mail processing facilities after the fact and were included in the various strata based on the size of the facility.

The 'MP Sample' worksheet (page 7) contains a list of all the mail processing facilities. Column E shows the date the PostalCAD drawings for the various facilities were last modified by field personnel prior to being tagged and mapped. Columns F through T contain the record details from the space survey section of eFMS. Column U shows the percentage difference between the eFMS square footage and the measured square footage. Columns V through X show the number of carriers housed at the mail processing facilities.

The 'D&R Sample' worksheet (page 8) contains a list of the sample delivery and retail facilities. Column D shows the date the PostalCAD drawings for the various facilities were last modified by field personnel prior to being tagged and mapped. Columns E through S contain the record details from the space survey section of eFMS. Column T shows the percentage difference between the eFMS square footage and the measured square footage. Columns U through W show the number of carriers housed at the delivery and retail facilities.

B. eFMS Summary Worksheet

The 'eFMS Sum' worksheet (page 27) contains square footage data for all active postal-managed records. These data were pulled from EDW. Column D contains the net interior square footage data. These data are not used for any purpose in this analysis, but are included because the value in cell D45 matches that shown in the Facilities Area Building Inventory Report. This report is a summary level report and does not contain building gross square footage data. Consequently, after the more detailed data were pulled from EDW, this figure serves as a check that the dataset was complete. The square footage data in columns D through K were all pulled using the space survey feature in EDW. Column L contains the number of population records for the delivery and retail facilities. Row 44 contains "non-building related" square feet that were excluded from the analysis. The records that were excluded from the analysis included a handful of facilities that were known to be closing, ground leases, and peak annex facilities. These latter facilities were excluded because of the approach used to calculate the peak adjustment, which is described below.

C. Peak Adjustment Worksheet

The 'Peak Adj' worksheet (page 28) contains data related to peak annex operations. The data in columns B through G were provided by Headquarters Operations personnel. Column D indicates whether the annex supports network operations (mail processing) or delivery operations. Column E indicates the type of facility (P&DC, NDC, ISC, or delivery). Column F contains the annex square footage. Column G contains the length of the lease in months.

The facilities within the postal network, and therefore the total network space, can change over time. These changes, however, occur relatively slowly. The total building gross square footage is therefore roughly the same throughout a given fiscal year. Peak annexes, however, are typically only required for a fraction of a year.

Given that the vast majority of peak annex lease terms are for less than one year, the Postal Service proposes that a peak annex adjustment be added to the total network space. This adjustment is expressed in annual terms and is equal to the weighted average of the lease term (in years) and the total space for each annex. The adjusted space values are calculated in column H. The adjusted square footage for the P&DCs, ISCs, NDCs, and delivery facilities are shown in cells H98:H101.

There are multiple reasons that could lead to space shortages during peak season, but one of the primary reasons is the increase in the volume of parcel-shaped mail. For purposes of this analysis, it is assumed that the parcel volume increase is the main reason additional space is required. Consequently, the space adjustment figures in cells H98, H99, H100, and H101 are incorporated into the MODS MANP, MODS ISC, NDC MANP, and NONMODS MANP operation space totals, respectively.

D. Strata Worksheets

The strata worksheets 'S01' (page 10) through 'S17' (page 26) in this file correspond to the strata described above in Section III and are organized into three sections. The leftmost section within each worksheet links to the "measured" data in the space form worksheet in each mapping file for all facilities within that strata. The other access space and overall building support space from the mapping files are distributed to all the operations and functions based on the distribution of space in those operations and functions. In addition, the aisle space and unspecified work room floor staging space from the mapping files are distributed to the mail processing operations only (numbers 1 through 51) based on the distribution of space in those operations. The total space value for each facility in this section of the worksheets matches the total value tagged and mapped in the mapping file.

The middle section of these worksheets "reconciles" the measured space value for each facility to the eFMS sampled space for each facility. In this section, the measured values for the non-sampled operations and functions are set to zero and the space distribution for the remaining measured space is applied to the total eFMS sampled space for that facility. As a reminder, the non-sampled space refers to those categories for which eFMS data can be directly assigned to an operation or function. For delivery and retail facilities, the non-sampled space includes the platform space (number 39), VMF space (number 62), covered vehicle storage and parking space (number 63), and vacant/GSA/tenant space (number 64). The non-sampled space for mail processing facilities is the same, with the exception that the platform space (numbers 18 and 34) is considered to be sampled space. The mail processing platform

space is treated differently because there are operations performed on the platforms at many mail processing facilities. For example, the breakdown of collection mail performed in MODS operation 018 after that mail arrives at the mail processing plants each afternoon is often performed in bullpens that are located on the docks.

In the 'S15' worksheet that represents stations and branches, there are additional calculations performed in columns CO and CP that represent finance stations and branches. In general, finance stations and branches contain no carrier operations. In addition, there are some finance stations and branches, referred to as "no delivery" offices in FDB, which contain no box section operations. The percentage distribution in columns CO and CP were calculated using data from column CM, but excluded any functions related to carrier operations. The percentage distribution in column CP further excluded any operations and functions related to post office box operations. The modified volume distributions are used to estimate the space for finance stations and branches given that there were no layouts for finance stations found on the FFS drive.

The rightmost section in the strata worksheets contains statistical calculations that are used to estimate the variance for each operation and function in each stratum. These calculations are described in more detail below.

E. R Worksheet

The 'R' worksheet (page 9) contains the R_{CRE} calculations for each stratum, or strata group if some strata are being combined. As stated above, the estimator that is being used in this analysis is the combined ratio estimator.[9] With the combined ratio estimator, the population space for each operation and function is estimated as follows:

[9] Cochrane, op. cit., at 165.

$$Y_h = X_h * [\sum_h (N_h * \mu_{yh}) / \sum_h (N_h * \mu_{xh})], \text{ or}$$

$$Y_h = X_h * R_{CRE}, \text{ where}$$

Y_h = the estimated space for an operation or function for a stratum or group of strata

X_h = the eFMS population "sampled" space for a stratum or group of strata

$R_{CRE} = [\sum_h (N_h * \mu_{yh}) / \sum_h (N_h * \mu_{xh})]$, and

N_h = the population for stratum h

μ_{yh} = the mean reconciled space for a given operation or function in stratum h

μ_{xh} = the mean eFMS "sampled" space for the sample facilities in stratum h

For every stratum that is not combined with at least one other stratum in this analysis, the R_{CRE} values are identical to the R values that would have been calculated had the separate ratio estimator been used. The variance for the space estimates for each operation and function is calculated as follows:

$$V(Y_h) = [N_h^2 * (1 - f_h) / n_h] * (\hat{S}_{yh}^2 + \check{R}_h^2 * \hat{S}_{xh}^2 - 2 * \check{R}_h * \rho_h \hat{S}_{yh} \hat{S}_{xh}), \text{ where}$$

N_h = the population for stratum h

$f_h = n_h / N_h$

n_h = the number of sample facilities in stratum h

$\hat{S}_{yh}^2 = \Sigma_i (y_{hi} - \mu_{yh})^2 / (n_h - 1)$, or the variance of the operation / function space in the h stratum

R_h = the R_{CRE} value for the stratum or group of strata

$\hat{S}_{xh}^2 = \Sigma_i (x_{hi} - \mu_{xh})^2 / (n_h - 1)$, or the variance of the eFMS "sampled" space in the h stratum

$\rho_h \hat{S}_{yh} \hat{S}_{xh} = [\Sigma_i (x_{hi} - \mu_{xh}) * (y_{hi} - \mu_{yh}) / (n_h - 1)]$, or the covariance of the operation / function space and eFMS "sampled" space in the h stratum

μ_{yh} = the mean reconciled space for a given operation or function in stratum h

μ_{xh} = the mean eFMS "sampled" space for the sample facilities in stratum h

As stated above, the variance calculations for each stratum are contained in the individual stratum worksheets (pages 10-26).

F. Functional Total Worksheets

The space estimates are first calculated individually for the mail processing, delivery and retail, and other functions. The functional total worksheets are the 'MP' worksheet (page 3), the 'D&R' worksheet (page 4), and the 'Other' worksheet (page 5).

The 'MP' worksheet (page 3) contains the mail processing space estimates by operation and function. Columns K through Q contain the combined ratio estimator calculations in which the R_{CRE} values (page 9) for each operation and function are multiplied by the eFMS population sampled space for each stratum or group of strata from the 'MP Sample' worksheet (page 7). The non-sampled space for functions 62, 63, and 64 are taken directly from the eFMS data in the 'MP Sample' worksheet (page 7) for each stratum or group of strata. The space values in column J are the sum of the space values in columns K through Q. The space values in columns G through I represent mail processing space that has been taken directly from the 'eFMS Sum' worksheet (page 27) for the bulk mail entry unit (BMEU), computerized forwarding system (CFS) unit, and mail recovery center (MRC) records. The space value in column F is the sum of the non-sampled space in columns G through I and the sampled space in column J. Column E contains the space values from the 'Peak Adj' worksheet (page 28). The total mail processing space by operation and function is calculated in column D and is the sum of the values in columns E and F.

The 'D&R' worksheet (page 4) contains the delivery and retail space estimates by operation and function. Columns H and K contain the combined ratio estimator

calculations in which the R_{CRE} values (page 9) for each operation and function are multiplied by the eFMS sampled space for each stratum or group of strata from the 'eFMS Sum' worksheet (page 27). The space values in columns I and J are calculated by multiplying the finance station and branch percentage distribution values from the 'S15' worksheet (page 24) by the eFMS sampled space for finance stations and branches from the 'eFMS Sum' worksheet (page 27). The space values in column G are equal to the sum of the values in columns H through K. Column D contains the sum of the peak space in column E and the space values in column G, with the exception that an adjustment is made to the city and rural carrier space functions (56 and 57).

In the 'D&R Sample' worksheet (page 8), the city carriers represented 65.79 percent of the total carriers and the rural carriers represented 34.21 percent of the total carriers. According to the FY 18 Annual Report to Congress (ARC) filed in Docket ACR2018, USPS-FY18-17, the nationwide percentage distribution between city carriers and rural carriers is 61.83 percent and 38.17 percent, respectively. The number of city and rural carriers from the ARC is contained in column F in the 'D&R' worksheet and is used to redistribute the space between these two functions in column D.

The 'Other' worksheet (page 5) contains space values in which the eFMS records could be mapped directly to specific operations or functions. These functions can be found in columns E through M and include self-service postal centers (SSPC), detached box units (DBU), district offices, maintenance facilities, VMFs, covered vehicle storage and parking, vacant/GSA/tenant space, Headquarters and Area offices, and storage facilities. The space values for these functions can be found in the 'eFMS Sum' worksheet (page 27). Column D is the sum of the values in columns E through M.

G. Summary Worksheet

The 'Sum' worksheet (page 1) contains the total space estimates by operation and function that are presented in Table 1 above. It is the sum of the individual mail processing, delivery and retail, and other space estimates from column D in the 'MP' worksheet (page 3), column D in the 'D&R' worksheet (page 4), and column D in the 'Other' worksheet (page 5), respectively.

H. Coefficient of Variation Worksheet

The 'CV' worksheet (page 2) contains estimates of the variance, standard error, and coefficients of variation by operation and function. The variance values in column D are the sum of the variance estimates in pages 10-26. The standard error values in column E are the square root of the variance values in column D. The coefficients of variation values in column F are calculated to be the standard error values in column E divided by the sum of the total sampled space in column J of the 'MP' worksheet (page 3) and the sampled space in columns H and K of the 'D&R' worksheet (page 4).

VI. STUDY RESULTS

The results from the study are presented in Table 5 below. The space distribution results are compared to the values that were contained in Docket No. ACR2018, USPS-FY18-8. The coefficients of variation values for sampled space are compared to the results from the 1999 study. Given that the cost pools have changed over the past twenty years, some direct comparisons are not possible or are imperfect. For example, the current generation of flats sorting machines and tray sorting equipment did not exist in 1999, so the flat sorting machine model 881 (FSM881) and tray management system (TMS) figures are provided for comparison purposes.

Table 5:
Facility Space Usage Study Results

No.	Operation / Function		All Facilities Building Gross Square Feet	Percent Distribution	USPS-FY18-8 Percent Distribution	Coefficient Of Variation	1999 Study Coefficient Of Variation
1	MODS 11 & 15	D/BCS	12,853,171	4.196%	3.173%	4.256%	5.300%
2	MODS 12 & 17	AFSM100	5,151,274	1.682%	1.400%	4.583%	5.900%
3	MODS 12 & 17	FSS	3,329,240	1.087%	1.289%	7.263%	NA
4	MODS 13	APBS	9,453,417	3.086%	2.467%	7.501%	8.900%
5	MODS 16	LCUS-SSM	1,613,493	0.527%	0.421%	11.826%	17.600%
6	MODS 16	1TRAYSRT	3,985,836	1.301%	0.771%	5.942%	15.500%
7	MODS 14	MANF	925,238	0.302%	0.088%	7.423%	7.600%
8	MODS 14	MANL	953,668	0.311%	0.114%	9.909%	4.400%
9	MODS 14	MANP	2,511,204	0.820%	0.315%	8.790%	9.500%
10	MODS 14	PRIORITY	902,869	0.295%	0.803%	8.367%	20.000%
11	MODS 15	LD15RECS	347,928	0.114%	0.134%	7.694%	7.100%
12	MODS 17	1CANCEL	2,668,509	0.871%	1.195%	5.965%	4.000%
13	MODS 17	1DSPATCH	763,477	0.249%	0.346%	12.692%	NA
14	MODS 17	1MTRPREP	39,021	0.013%	0.000%	29.114%	NA
15	MODS 17	1OPBULK	542,543	0.177%	0.335%	11.689%	8.100%
16	MODS 17	1OPPREF	894,104	0.292%	0.665%	11.794%	6.400%
17	MODS 17	1OPTRANS	0	0.000%	0.000%	NA	NA
18	MODS 17	1PLATFRM	7,942,716	2.593%	4.532%	3.625%	4.900%
19	MODS 17	1POUCHNG	225,182	0.074%	0.153%	16.512%	8.200%
20	MODS 17	1PRESORT	84,041	0.027%	0.086%	27.472%	10.200%
21	MODS 17	1SACKS_H	42,511	0.014%	0.199%	27.825%	14.000%
22	MODS 17	1SCAN	1,294,658	0.423%	0.452%	11.125%	19.600%
23	MODS 18	BUSREPLY	31,517	0.010%	0.065%	31.223%	18.200%
24	MODS 18	EXPRESS	403,861	0.132%	0.179%	10.686%	11.100%
25	MODS 18	REGISTRY	468,064	0.153%	0.186%	19.512%	4.200%
26	MODS 18	REWRAP	85,108	0.028%	0.047%	20.443%	8.000%
27	MODS 18	1EEQMT	2,236,781	0.730%	1.086%	10.060%	8.000%
28	MODS 18	1MISC	133,033	0.043%	0.230%	14.031%	12.200%
29	MODS 18	1SUPPORT	6,258	0.002%	0.000%	99.428%	NA
30	All LDCs	INTL ISC	2,434,592	0.795%	0.535%	0.000%	15.100%
31	NDCS 12 & 17	FSS	328,647	0.107%	0.000%	0.000%	NA
32	NDCS 14	MANP	633,382	0.207%	0.214%	14.143%	35.300%
33	NDCS All LDCs	OTHER	951,088	0.310%	0.446%	11.908%	14.200%
34	NDCS 17	PLA	1,960,681	0.640%	0.856%	11.319%	5.000%
35	NDCS 13	PSM	3,458,428	1.129%	1.162%	7.703%	15.600%
36	NDCS 13	APBS	915,039	0.299%	0.252%	16.067%	14.500%
37	NDCS 16	LCUS-SSM	729,622	0.238%	0.392%	9.034%	16.200%
38	NDCS 16	TRAYSORT	761,036	0.248%	0.052%	21.299%	NA
39	NONMODS IOCS	ALLIED	13,645,140	4.455%	10.247%	NA	4.300%
40	NONMODS IOCS	AUTO/MECH	129,573	0.042%	0.037%	12.245%	9.700%
41	NONMODS IOCS	BULKACC	1,673,356	0.546%	0.548%	17.501%	6.400%
42	NONMODS IOCS	BUSREPLY	64,765	0.021%	0.000%	52.809%	NA
43	NONMODS IOCS	CFS	4,425,592	1.445%	0.000%	11.912%	9.900%
44	NONMODS IOCS	D.PO BOX	12,250,838	3.999%	0.388%	8.799%	NA
45	NONMODS IOCS	EXPRESS	71,732	0.023%	0.143%	75.901%	12.200%
46	NONMODS IOCS	MANF	4,293,378	1.402%	1.051%	11.513%	4.800%
47	NONMODS IOCS	MANL	3,748,355	1.224%	0.960%	14.261%	7.200%
48	NONMODS IOCS	MANP	19,141,118	6.249%	2.052%	6.142%	5.900%
49	NONMODS IOCS	MISC	1,960,199	0.640%	1.072%	39.586%	7.000%
50	NONMODS IOCS	OTH ACCT	800,880	0.261%	0.000%	38.593%	NA
51	NONMODS IOCS	REGISTRY	663,176	0.217%	0.218%	34.766%	7.400%
52	Window Service		18,220,608	5.948%	6.092%	8.932%	2.700%
53	Self-Service Postal Center		738,228	0.241%	0.832%	50.968%	7.700%
54	Post Office Boxes / Caller Service		12,074,197	3.942%	8.919%	8.668%	3.100%
55	Claims & Inquiry		122,940	0.040%	0.152%	97.826%	8.600%
56	City Carrier		35,255,807	11.510%	8.724%	9.557%	4.100%
57	Rural Carrier		21,330,487	6.964%	2.915%	10.443%	6.900%
58	Office Space / Corridors		24,029,897	7.845%	8.823%	6.623%	3.800%
59	Mail Processing Equipment Maintenance		5,468,995	1.785%	1.595%	4.115%	6.400%
60	Other Equipment Maintenance		1,293,900	0.422%	0.727%	30.196%	10.200%
61	Employee Facilities		16,612,468	5.423%	7.814%	5.003%	1.900%
62	Vehicle Maintenance Facility (VMF)		5,426,578	1.772%	2.233%	NA	NA
63	Covered Vehicle Storage and Parking (CVS)		13,658,010	4.459%	3.063%	NA	NA
64	Vacant & Tenant		4,820,660	1.574%	2.691%	NA	NA
65	HQ, HQ Field Related and Area Offices		6,849,016	2.236%	1.980%	25.186%	NA
66	Mail Transportation Equipment Service Centers (MTESC)		0	0.000%	0.352%	NA	NA
67	Storage Facilities		5,478,839	1.789%	1.731%	16.801%	5.400%
Total			306,309,966	100.000%	100.000%		

There is one operation and one function that were established at the beginning of this study for which there was no dedicated space found on any of the facility layouts. Table 5 contains no space estimate for the MODS 1OPTRANS operation. The costs that are assigned to this operation represent inter-operation container movement tasks. Given that this operation relates solely to container movements, there was no dedicated floor space found on any of the layouts. Table 5 also contains no space estimate for the mail transportation equipment service centers (MTESC) function. Postal contractors now perform the tasks previously performed by MTESCs, so there was also no dedicated space found on any of the layouts.

The space results for the MODS MANP and MODS PRIORITY operations also warrant discussion. The estimated space for the MANP operation was nearly three times that of the PRIORITY operation. However, the FY 2018 MODS work hours associated with the PRIORITY operation represented 93 percent of the total work hours associated with the MANP and PRIORITY operations combined. The space for these operations was not always specifically marked with operation numbers on the drawings. In addition, it was not always clear whether these two operations shared some of the same workroom floor space. It is therefore recommended that the space for these operations be piggybacked in aggregate, similar to the manner in which the space for the APBS parcel and bundle sorting operations are piggybacked in aggregate.

Considering all the network and equipment changes that have taken place since 1999, one would not expect that the space distribution percentages would exactly match those previously contained in USPS-FY18-8. The Postal Service has continuously made adjustments to USPS-FY18-8 over time as different types of equipment have

been removed from and deployed to mail processing facilities. Those adjustments, however, typically involved the average "footprint" (space value) for a given machine. There are other circumstances that affect how much space a machine requires, such as the location of columns in a given facility. In addition, some machines vary in size. The actual workroom floor space required to support a given machine could therefore be more than the average space value.

In addition, the adjustment process did not include changes related to facility activations, closures, or consolidations. In normal circumstances, such changes would occur relatively slowly. The network, however, has undergone significant changes due to the steep volume declines that have occurred over the past decade.

Finally, the types of mail processed by the Postal Service has changed over time. The volume of letter-shaped mail and flat-shaped mail has decreased, while the volume of parcel-shaped mail has increased.

The coefficient of variation values that were calculated for the DBCS, AFSM100, APBS/APPS, and FSS categories were close to the anticipated values presented above in Table 3. The tasks that had the highest coefficient of variation estimates were typically those operations or functions for which small amounts of space were sporadically found on the facility layouts.

CONCLUSION

The results from the Facility Space Usage Study are used as inputs to the facility-related cost analysis that was last presented in Docket No. ACR2018, USPS-FY18-8. The FSUS was completed over a two-year period by a small team of Headquarters personnel. The team was able to utilize tools that were not available during the previous study (e.g., webEOR, the Facility File Share server), which

enhanced the accuracy of this study. The process that was used to tag, map, and review the drawings was also fairly standardized when compared to the previous study. Consequently, the variation that might have existed in previous studies, due to differences in how field personnel completed the surveys, was not a factor in the current study.

Despite these improvements, future FSUS projects are not likely to be inexpensive or short in duration. The data collection process, in and of itself, is always going to be time consuming. Fortunately, the results from this study will not require extensive modification unless the postal network is dramatically overhauled. Instead, the analysis can be modified annually to reflect equipment removals and deployments.

The space estimates by operation and function from the current study represent an improvement over the data previously contained in USPS-FY18-8 and are reflective of the space requirements in place at the end of FY 2019, Quarter 1. Future USPS-FY19-8 modifications related to the removal and deployment of equipment should therefore begin with changes made in FY 2019, Quarter 2.

As stated above, the space estimates for the FSUS sample were inflated to population estimates using nationwide space data. Originally, the facility database (FDB) space records were going to be used for this purpose. Datasets that contain FDB data are burdensome because there are multiple records for the same facility space. Consequently, duplicate space records must be deleted from any FDB dataset. By definition, the process used to maintain these datasets is time consuming and tedious.

The Postal Service intended to use space data in the FSUS study that reflected operational needs at the end of FY 2019, Quarter 2, because the USPS-FY19-8 analysis, which relies on the FSUS results, typically measures space changes from the midyear of one fiscal year to the next. Due to the complications associated with using FDB data, the Postal Service began looking for alternative measures that could be obtained more directly from eFMS. Unfortunately, the team members were not able to successfully isolate the necessary eFMS data until FY 2019, Quarter 3. Given the relatively slow pace at which the total facility space changes, the Quarter 3 data should serve as an adequate proxy for the Quarter 2 data.

In summary, the FSUS results reflect the distribution of operational space at the end of FY 2019, Quarter 1, which is then applied to the total eFMS gross building square footage data from FY 2019, Quarter 3. The USPS-FY19-8 analysis will contain adjustments that reflect the midyear distribution of operational space at the end of FY 2019, Quarter 2. The eFMS space data in USPS-FY19-8, however, will not represent the Quarter 2 timeframe. Instead, the Postal Service proposes that the Quarter 3 eFMS space data be used to approximate postal space requirements for Quarter 2. In future ACR dockets, the eFMS data will reflect the actual Quarter 2 space for each fiscal year.